

REMARKS

Reconsideration of this application, based on this amendment and these following remarks, is respectfully requested.

Claims 1, 3, 4, 6 through 11, 14, 17 through 20, 23, 24, 27, and 28 remain in this case. Claims 1, 3, 4, 6, 8 through 11, 14, 17, 19, 20, 23, 24, 27 and 28 are amended. Claims 2, 5, 12, 13, 15, 16, 21, 22, 25, and 26 are canceled.

The Examiner objected to the drawings because Figures 1 and 2 lacked the designation "PRIOR ART". Figures 1 and 2 are amended to provide that legend, to overcome the objection, as shown in the marked-up and replacement sheets submitted with this amendment.

Claim 17 was objected to because of an informality in the conjunction used. Claim 17 is amended as suggested by the Examiner, to overcome the objection.

Claims 10 through 14 and 19 through 28 were rejected under §112, ¶1, as not supported by a written description.

Regarding claims 10 through 14, the Examiner asserted that the limitation of claim 10 regarding the location to which the first and third sets of contents are written upon determining that no other contents remain to be obtained; claim 10 was also rejected under §112, ¶2 on this basis.. Claims 11 through 14 were rejected because of their dependency on claim 10.

Claim 10 is amended to overcome the rejection, and for other reasons. In connection with this basis of rejection, amended claim 10 now recites that the steps of writing the first and third sets of contents to the second physical block are performed responsive to determining that additional contents for the first logical block do not currently remain to be written. The specification of this application clearly supports this amendment to claim 10,¹ and as such no

¹ Specification of S.N. 10/678,672, as published as U.S. Patent Application Publication No. US 2004/0083348, paragraphs [0122], [0131]. All references to the specification will be made relative to this publication, for convenience.

new matter is presented. In addition, this support in the specification illustrates that amended claim 10 and its dependent claims are clearly supported by the specification. Applicants submit that these bases of rejection of claims 10 through 14, under §112, ¶¶1 and 2, is now overcome.

Claims 19 through 28 were rejected under §112, ¶1, as not supported by the specification because of apparent confusion regarding where the contents of the updates are eventually stored; claim 19 was also rejected under §112, ¶2 for this reason. Claim 19 is amended to overcome the rejection, by now reciting that the contents of the cache are stored in the second physical block, rather than the first physical block as originally recited. Support for this amendment to claim 19 is clearly provided by the specification.² As such, Applicants submit that no new matter is presented by this amendment to claim 19, and that this claim and its dependent claims are now adequately supported by the written description so as to meet the requirements of §112, ¶1, and sufficiently definite to meet the requirements of §112, ¶2, overcoming these rejections.

Various ones of claims 1 through 28 were also rejected under §112, ¶2 as indefinite for failing to particularly point out and distinctly claim the subject matter of the invention, because of the use of the word “substantially”. The claims are amended to cancel all instances of the word “substantially”, overcoming the rejection on this basis.

Claims 1 through 17 and 19 through 27 were rejected under §103 as unpatentable over the admitted prior art in view of the Hagiwara et al. reference³. Claims 18 and 28 were rejected under §103 as unpatentable over the admitted prior art and the Hagiwara et al. reference, further in view of the Kim et al. reference⁴.

Claim 1 is amended to overcome the rejection to it and its dependent claims. Amended claim 1 now recites that the first logical block includes a plurality of logical groups, each of which includes a plurality of logical pages, and that the first and second physical blocks each include a plurality of physical groups, each physical group including a plurality of physical

² Specification, *supra*, paragraphs [0122] through [0124].

³ U.S. Patent Application Publication No. US 2003/0110343 A1, published June 12, 2003, from an application by Hagiwara et al. filed June 12, 2002.

pages. Amended claim 1 now further includes the step of writing a first set of contents associated with the first logical group to a first physical group of the first physical block, such that the second set of contents associated with logical pages of the first logical group are written to the memory area. The claim further recites the writing of the first set of contents from the first physical group and the second set of contents from the memory area into a first physical group of a second physical block. The specification clearly supports this amendment to claim 1,⁵ and as such no new matter is presented.

Claims 2, 5, 12, 13, 15, and 16 are canceled, and claims 3, 4, 6, 8 through 11, 14, and 17 are amended, for consistency with the amendment to claim 1, and for clarity.

The method of amended claim 1 provides important advantages over conventional methods for operating flash memories. The use of a memory area to cache updated contents of data previously stored in physical blocks of flash memory greatly reduces the number of write and erase cycles applied to the physical blocks,⁶ and the application of this technique to groups of pages within physical and logical blocks provides a great deal of flexibility in the handling of these updates, further improving the efficiency of the write and erase operations in flash memories.⁷

Applicants submit that the combined teachings of the applied prior art fall short of the requirements of amended claim 1 and its dependent claims. The admitted prior art cited against the claims nowhere discloses the grouping of pages within a logical or physical block into one of a plurality of groups within that block, as now recited by amended claim 1. Rather, as pointed out in the Office Action,⁸ the Examiner considered the physical blocks as corresponding to the physical groups. The amendment to claim 1 negates that application of the teachings of the admitted prior art, because amended claim 1 now requires that each of the first and second physical blocks includes a plurality of physical groups, each physical group including a plurality

⁴ Kim et al., "A Space-Efficient Flash Translation Layer for Compactflash Systems", *Trans. on Consumer Electronics*, Vol. 48, No. 2 (IEEE, 2002).

⁵ See specification, *supra*, e.g. at paragraphs [0096 through 0099].

⁶ Specification, *supra*, paragraph [0056].

⁷ Specification, *supra*, paragraphs [0096] and [0097].

of physical pages. Accordingly, the admitted prior art does not reach the requirements of amended claim 1 in this regard.

Nor does the Hagiwara et al. reference provide such teachings. Rather, the Hagiwara et al. reference teaches only the use of conventional blocks (referred to as “banks” in the reference⁹). Applicants submit that the “file blocks” of the reference¹⁰ correspond to conventional flash memory pages, in that the term “file block” as used in the reference clearly is referring to the smallest programming unit (*i.e.*, “page”, in conventional usage in the flash memory art¹¹). Considering this most reasonable interpretation of the Hagiwara et al. reference, it is clear that the reference fails to disclose or suggest the arrangement of logical and physical blocks into a plurality of groups of logical and physical pages, respectively, as required by amended claim 1. Accordingly, the Hagiwara et al. reference fails to add any teachings to those of the admitted prior art in this regard. Nor does the Kim et al. reference provide such teachings.

Applicants therefore respectfully submit that the combined teachings of the applied prior art fall short of the requirements of amended claim 1, as none of the references disclose the arrangement of the logical and physical blocks in the non-volatile memory, upon which the operation of the claimed method is performed.

Applicants further respectfully submit that there is no suggestion from the prior art to modify these teachings in such a manner as to reach amended claim 1. None of the applied prior art mention or indicate that such grouping ought to be done, much less for use in the caching method now recited in amended claim 1. Absent such suggestion in the prior art, amended claim 1 and its dependent claims are *prima facie* patentable, and proper consideration of the benefits provided by the method of amended claim 1 would convince the skilled artisan of the inventiveness of Applicants’ method.

⁸ Office Action of February 10, 2006, page 9.

⁹ See Hagiwara et al., *supra*, paragraphs [0004] through [0006], [0075].

¹⁰ *Id.*, paragraphs [0077] through [0080].

¹¹ Specification, *supra*, paragraph [0067].

Applicants therefore respectfully submit that amended claim 1 and its dependent claims are patentably distinct over the prior art of record in this case.

Claim 19 is similarly amended as claim 1, discussed above. Amended claim 19 now recites that the first logical block includes a plurality of logical groups, each including a plurality of logical pages, and that the first and second physical blocks each include a plurality of physical groups, each including a plurality of physical pages. As discussed above relative to claim 1, Applicants submit that this amendment to claim 19 is fully supported by the specification, and as such involves no new matter.

Claims 20, 23, 24, 27, and 28 are amended, and claims 21, 22, 25, and 26 are canceled, considering this amendment to claim 19, and for clarity.

The method of amended claim 19 and its dependent claims provide similar advantages as discussed above relative to amended claim 1. In summary, the method of processing updated contents for a non-volatile memory system, including the storing of such updates in a cache and the storing of these contents into physical blocks, greatly reduces the number of write and erase cycles applied to the physical blocks.¹² And, as discussed above relative to amended claim 1, the grouping of pages within physical and logical blocks, and the operating on these groups as recited in the claims, provides a great deal of flexibility and improved efficiency in the caching of these updates.¹³

Applicants submit that the combined teachings of the applied prior art fall short of the requirements of amended claim 19, and therefore fall short of its remaining dependent claims. The admitted prior art lacks disclosure of the grouping of logical and physical pages within a logical and physical blocks, respectively, where each of the logical and physical blocks include a plurality of such groups, as now recited by amended claim 19. The Examiners equating of physical and logical blocks as corresponding to groups of physical and logical pages,

¹² Specification, *supra*, paragraph [0056].

¹³ Specification, *supra*, paragraphs [0096] and [0097].

respectively, as asserted in the Office Action,¹⁴ cannot apply to amended claim 19, because the claim now requires that each such block include a plurality of such groups, each group including a plurality of pages. The Hagiwara et al. reference also lacks teachings in this regard, considering that it discloses only conventional blocks (referred to as “banks” in the reference¹⁵), and conventional pages within those blocks (referred to as “file blocks” in the reference¹⁶). Nor does the Kim et al. reference provide any teachings in this regard. Accordingly, Applicants submit that the combined teachings of the applied prior art, properly interpreted, falls short of the requirements of amended claim 19 and its dependent claims, because none of these prior art items disclose the grouping now required by the claims.

Nor is there suggestion from the prior art to modify these teachings in such a manner as to reach amended claim 19. The applied prior art wholly lacks any mention or indication that the pages within the corresponding blocks ought to be grouped within those blocks, much less for use in the caching and storing operations recited in amended claim 19. Only by the improper hindsight application of Applicants’ own references could such modification be made, especially considering the important benefits provided by the claimed method.

Applicants therefore respectfully submit that amended claim 19 and its dependent claims are also patentably distinct over the prior art of record in this case.

¹⁴ Office Action of February 10, 2006, page 20 and 21.

¹⁵ See Hagiwara et al., *supra*, paragraphs [0004] through [0006], [0075].

¹⁶ *Id.*, paragraphs [0077] through [0080].

For these reasons, Applicants respectfully submit that all claims now in this case are in condition for allowance. Reconsideration of this application is therefore respectfully requested.

Respectfully submitted,
/Rodney M. Anderson/
Rodney M. Anderson
Registry No. 31,939
Attorney for Applicants

Anderson, Levine & Lintel, L.L.P.
14785 Preston Road, Suite 650
Dallas, Texas 75254
(972) 664-9554